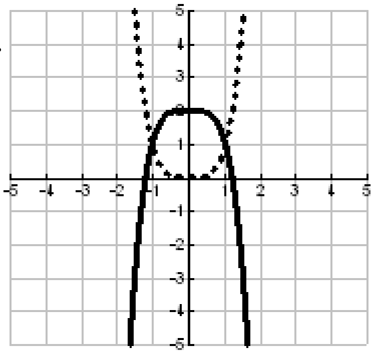
Chapter 3 & 4 Review Sheet -- SOLUTIONS
Math 176, Precalculus, Vanden Eynden

1.


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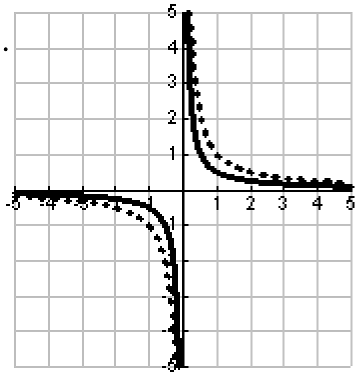

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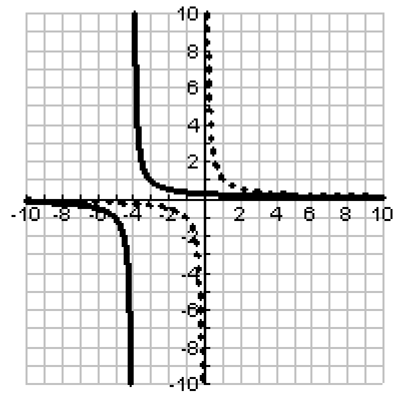

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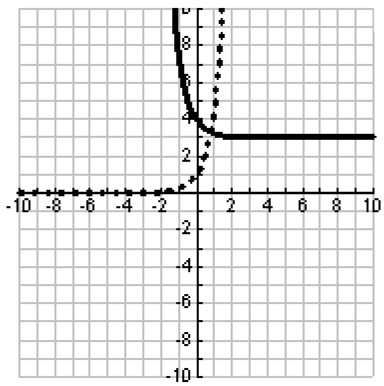

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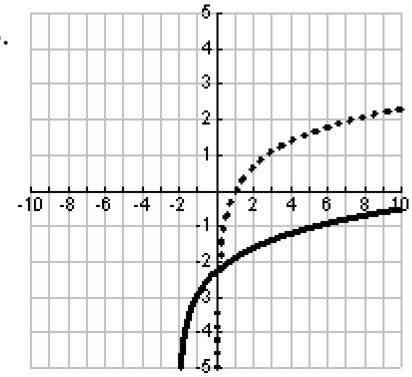
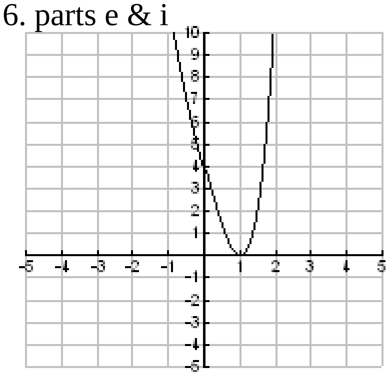


In words:
1. Reflect about the x-axis, then shift up 2 units
2. Shrink vertically by a factor of 1/2.
3. Shifted left 4 units
4. Reflected about the y-axis, then shifted up 3 units
5. Shifted left 2 units, down 3 units

6. a. End behaviors acts like $y = x^4$. As $x \to \pm\infty, y \to \infty$.
   b. 4 complex zeros counting multiplicities
   c. $P(x)$ can have up to 3 local extrema (it only has 1).
   d. $\pm 1, \pm 2, \pm 4$
   e. integer zeros: x = 1 (mult. 2)
   f. D: All reals, R: $[0, \infty)$
   g. $x = 1(mult.2), -1 \pm i\sqrt{3}$
   h. $P(x) = (x-1)^2 \left(x+1+i\sqrt{3}\right)\left(x+1-i\sqrt{3}\right)$
   i. See graph →

6. parts e & i


7. a. $2x - 3 + \dfrac{-2x+15}{x^2+2x}$. b. $3x^2 + 6x + 7 + \dfrac{10}{x-2}$.

8. $P(x) = (x-4)^2 (x-3i)(x+3i) = x^4 - 8x^3 + 25x^2 - 72x + 144$

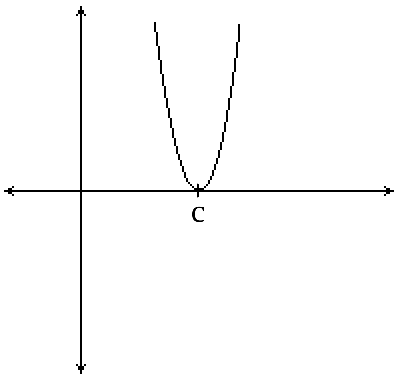
9. No, if a polynomial has integer coefficients then the list of zeros must include complex conjugates of every complex zero. Therefore, we must also include -*i*, -2*i*,-3*i* and -4*i* as zeros. But then you would have a degree 8 polynomial.

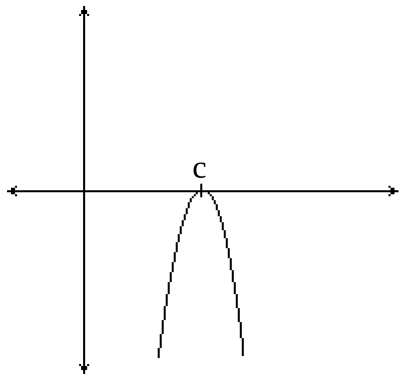
10. By the Remainder Theorem, $P(5) = 17$

11. $P(1)=34$ so the remainder is 34.

12. The graph will NOT cross the x-axis at *c*, but instead just touch the x-axis and "bounce back".

It will look like either this: or this:





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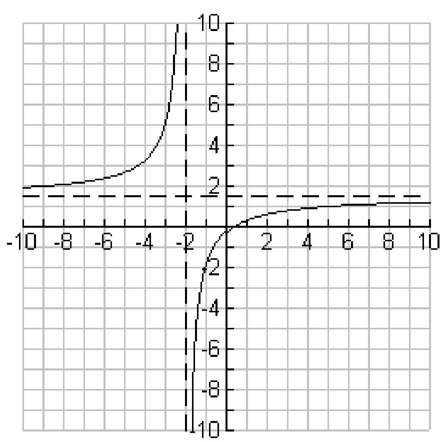
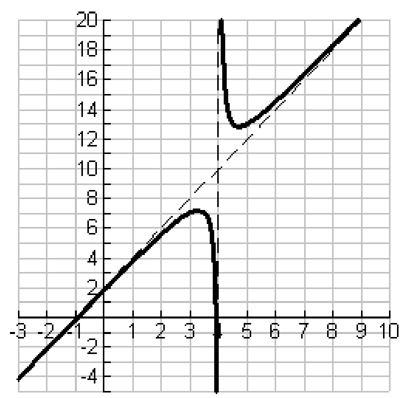
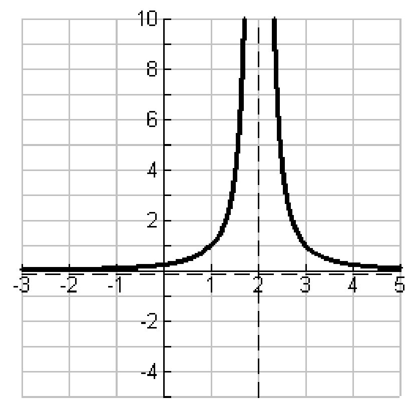






	a.	b.	c.
x-int	$(1/3,0)$	$\left(\frac{3\pm\sqrt{23}}{2},0\right)$	*none*
y-int	$(0,-1/4)$	$(0,7/4)$	$(0,1/4)$
V.A.	x = –2	x = 4	x = 2
H.A.	y = 3/2	y = 2 x + 2	y = 0
Domain	$\mathbb{R},\ x\neq -2$	$\mathbb{R},\ x\neq 4$	$\mathbb{R},\ x\neq 2$
Range	$\mathbb{R},\ y\neq 3/2$	Approx. $(-\infty,7.17]\cup[12.8,\infty)$	$(0,\infty)$

14. a. $(-\infty,-2)\cup(2,3)$ b. $(-\infty,-2)\cup\left[\frac{1}{7},\infty\right)$

15. $f^{-1}(x) = \log_5 x$

16. $k^{-1}(x) = 4^x$

17. a. 6 b. 3/2 c. 49 d. 2/3
e. 1 f. 0 g. 1/2 h. –1

18. $2\log x + \frac{1}{2}\log y$

19. $2\left[\log_2(x-1) - \log_2(x+1)\right]$

20. $\log\left(x^3 y^4\right)$

21. $\log\frac{(x-y)^{3/2}}{\left(x^2-y^2\right)^2} = \log\frac{1}{(x+y)^2(x-y)^{1/2}} = \log\frac{1}{(x+y)^2\sqrt{x-y}}$

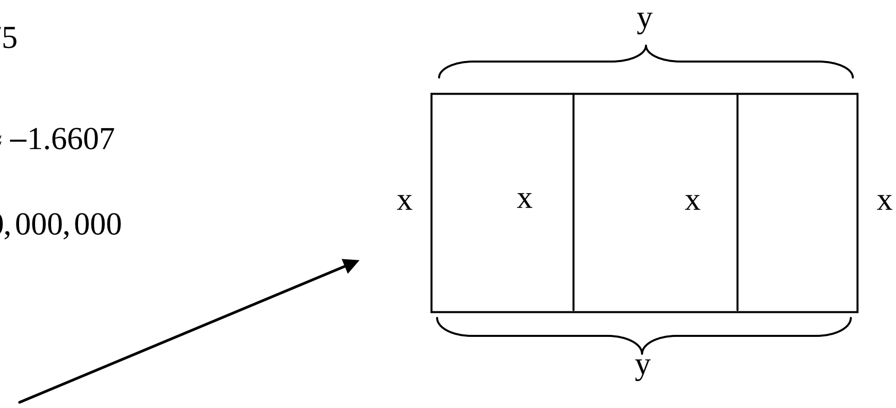
22. $x = \frac{\ln 10}{3} \approx 0.7675$

23. $x = \frac{\ln 2 - 5\ln 3}{2\ln 3 + \ln 2} \approx -1.6607$

24. $x = 10^{10} = 10,000,000,000$

25. $x = 3$

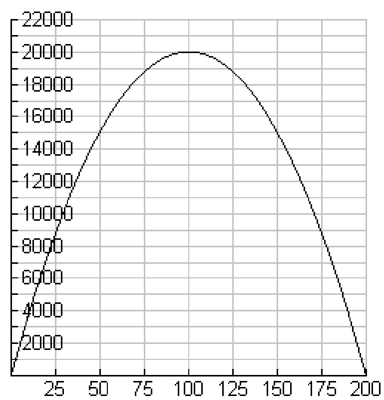
26. $x = 12500$



27. a. Draw a diagram, labeling the unknown lengths. Note that Perimeter = 800 = 4x + 2y. Solve this for y to get: y = 400 – 2x and substitute that into the Area formula $A = xy$.

$$A(x) = x(400-2x) = -2x^2 + 400x$$

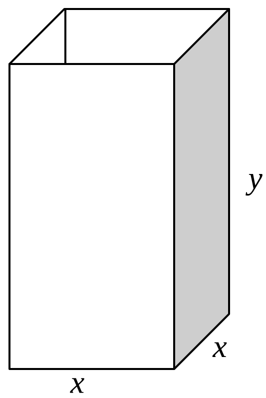
b. (0, 200)
c. Look right →
d. 100 ft ×200 ft



28. a. $A(t) = 5000\left(1+\frac{.085}{2}\right)^{2t}$, $A(1.5) = \$5665$

b. $7000 = 5000\left(1+\frac{.085}{2}\right)^{2t}$, *when* $t = 4.04$ years

29.



Volume = LWH

Constraint: $12 = x^2 y$ so $y = \frac{12}{x^2}$

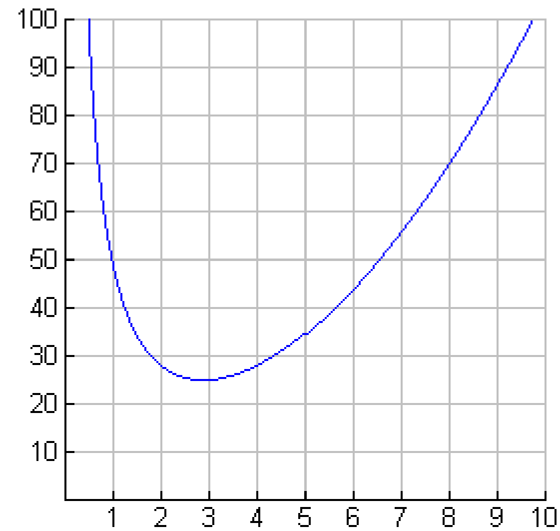
$SurfaceArea = S = 4xy + x^2$

$S = 4x\left(\frac{12}{x^2}\right) + x^2$

$S = \frac{48}{x} + x^2$

a. $S(x) = \frac{48}{x} + x^2$

b. Using a graphing calculator, the graph of S is:
The *x* that minimizes S is *x* = 2.88 ft.
The dimensions that minimize S are:
$2.88\,ft \times 2.88\,ft \times 1.44\,ft$



30. $2790 = 2500e^{r \cdot 1}$, solve for *r*, *r* = 0.1098. Rate of interest is 10.98%

31. $g(x) = -2(x-3)^2 + 5$; *g* has a maximum of 5.